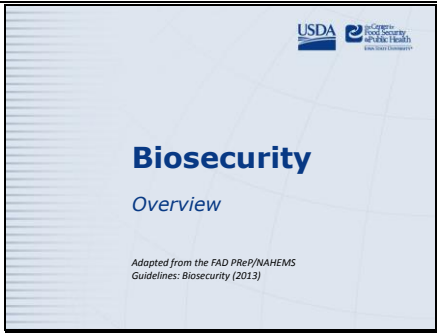
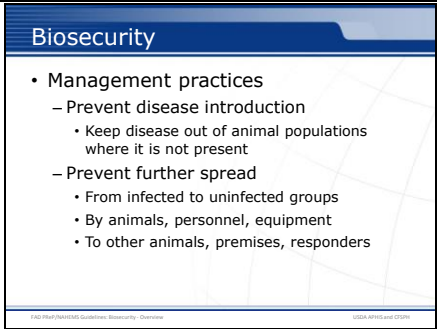
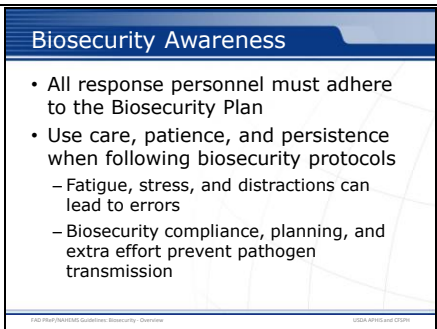
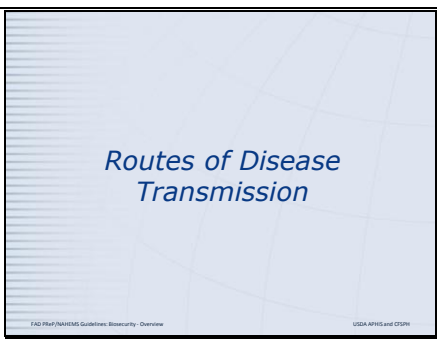



S I d e 1	 <p>The slide is titled "Biosecurity Overview" in large blue font. Below it, in smaller blue font, is "Overview". At the bottom, in small black font, it says "Adapted from the FAD PReP/NAHEMS Guidelines: Biosecurity (2013)". Logos for USDA and the Department of Agriculture are in the top right corner.</p>	<p>During an animal disease emergency response, strict biosecurity measures will be needed to control and contain the pathogen and prevent its spread to other animals, premises or responders. Understanding the risks of disease transmission and the necessary preventive procedures will be essential during the response. [This information was derived from the Foreign Animal Disease Preparedness and Response (FAD PReP)/National Animal Health Emergency Management System (NAHEMS) Guidelines: Biosecurity (2013)].</p>
S I d e 2	 <p>The slide is titled "Biosecurity" in white text on a blue header. Below the header, it lists management practices in black text: <ul style="list-style-type: none"> • Management practices <ul style="list-style-type: none"> – Prevent disease introduction <ul style="list-style-type: none"> • Keep disease out of animal populations where it is not present – Prevent further spread <ul style="list-style-type: none"> • From infected to uninfected groups • By animals, personnel, equipment • To other animals, premises, responders </p>	<p>Biosecurity is a series of management practices designed to prevent the introduction and spread of pathogenic agents onto or off of an animal production or housing premises. This includes keeping disease agents out of uninfected animal populations as well as preventing the further spread of disease agents to other groups or locations. When properly implemented, biosecurity measures will help reduce the risk of disease spread by the movement of animals, personnel, equipment, and other materials during response activities.</p>
S I d e 3	 <p>The slide is titled "Biosecurity Awareness" in white text on a blue header. Below the header, it lists awareness points in black text: <ul style="list-style-type: none"> • All response personnel must adhere to the Biosecurity Plan • Use care, patience, and persistence when following biosecurity protocols <ul style="list-style-type: none"> – Fatigue, stress, and distractions can lead to errors – Biosecurity compliance, planning, and extra effort prevent pathogen transmission </p>	<p>A Biosecurity Plan describes the mitigation measures to prevent the potential spread of the disease agent. The Plan is only effective if all emergency response personnel strictly adhere to the guidelines. Fatigue, stress, distraction, and lack of forethought can cause even the most conscientious individual to lose focus on the critical importance of biosecurity measures. All personnel must exercise the utmost thought, patience, persistence, and care when creating and carrying out a Biosecurity Plan. This applies both under normal circumstances and during an outbreak. A little advance thought, planning, and extra effort in establishing and implementing biosecurity procedures can go a long way toward preventing pathogen transmission, protecting the well-being of livestock and poultry, and safeguarding American agriculture.</p>
S I d e 4	 <p>The slide is titled "Routes of Disease Transmission" in blue text. The background is a light blue grid pattern. Logos for USDA and the Department of Agriculture are in the top right corner.</p>	<p>Pathogenic agents can be transmitted from animal to animal, or between animals and humans through a variety of routes. Understanding the routes of transmission is essential to developing and implementing a Biosecurity Plan. The most common routes of transmission are aerosol, oral, direct contact, fomites, vector and zoonotic.</p>

Routes of Transmission

- Aerosol
 - Pathogens inhaled by susceptible animal
 - Droplets
 - Close proximity required
- Oral
 - Pathogens consumed by susceptible animal
 - Feces, urine, saliva




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Aerosol transmission occurs when droplets containing pathogenic agents from an infected animal are inhaled by a susceptible animal. Most pathogenic agents transmitted via aerosols do not survive for extended periods of time in droplets, so infected and susceptible animals must be in close proximity for disease transmission to occur. Typically, respiratory diseases and some diarrheal diseases can be spread via aerosol transmission.

Oral transmission occurs when pathogenic agents are consumed by a susceptible animal. Feces, urine, saliva and other secretions may contain pathogenic agents which can contaminate feed, water, or other items in the environment that animals lick or chew. This includes items such as feed bunks, equipment, fencing, water troughs, salt and mineral blocks. [Top illustration depicts aerosol transmission (arrows); bottom illustration depicts oral transmission (arrow). Illustrations by: Andrew Kingsbury, Iowa State University]

Routes of Transmission

- Direct contact
 - Physical contact with pathogen
 - Infected animal or environment
- Fomites
 - Contact with inanimate object that transfers pathogen
 - Boots, vehicles, syringes and other equipment




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Transmission by direct contact occurs when a susceptible animal comes into physical contact with an infected animal or a pathogenic agent in the environment. Exposure occurs when the pathogenic agent comes in direct contact with the animal's skin, mucus membranes or an open wound. Transmission can occur through rubbing, biting, licking, or by contact with the blood or saliva of an infected animal, or through contact with fomites. Diseases spread during breeding or from dam to offspring during gestation are also considered to be transmitted by direct contact. Direct contact transmission can occur between animals of different species and through contact with humans.

Fomites are inanimate objects capable of transferring disease agents through either direct contact or oral transmission. Examples of fomites include: boots, clothing, vehicles, shovels, tools, bowls or buckets, tack, brushes, clippers, needles and other medical equipment. Vehicles and trailers with contaminated tires, wheel wells, and undercarriages can serve as fomites. Humans with contaminated clothing, shoes, or boots are also considered fomites having the potential for moving disease agents within the facility or from one facility to another. [Top illustration depicts direct contact transmission (arrows); bottom illustration depicts fomite transmission (arrows and syringe). Illustrations by: Andrew Kingsbury, Iowa State University]

Routes of Transmission

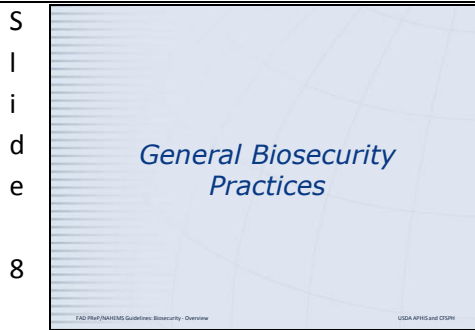
- Vectors
 - Insects/arachnids capable of transmitting pathogens
- Zoonotic
 - Pathogens spread between animals and humans via any route



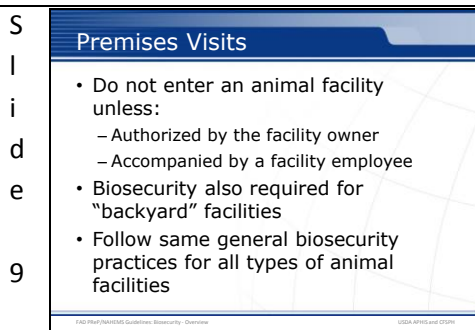
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Vectors are insects or arachnids capable of transmitting pathogens from an infected animal to a healthy animal. Vectors can transmit disease agents either mechanically or biologically. In mechanical transmission, the vector transports the disease agent from one animal to another, with the disease agent remaining unchanged. Many species of flies serve as mechanical vectors. Biological transmission occurs when the vector acquires the agent from an infected animal, usually through a bloodmeal, and the agent replicates or develops within the vector. The disease agent is subsequently introduced to a susceptible host, usually through a bite. Fleas, ticks and mosquitoes are common biological disease vectors.

Zoonotic diseases are transmitted between animals and humans. Human exposure to zoonotic diseases may occur through any of the five routes of transmission discussed previously. Because of public health concerns, the zoonotic risk of a particular pathogenic agent should be considered in a biosecurity risk assessment. [Top illustration depicts vector transmission (arrows); bottom illustration depicts zoonotic transmission. Illustrations by: Andrew Kingsbury, Iowa State University]



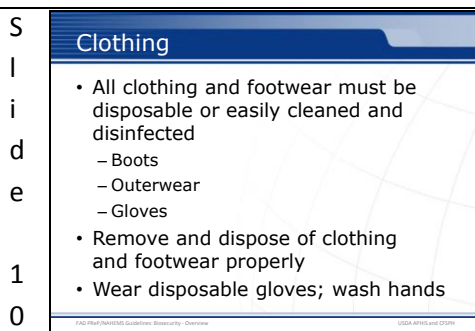
The following is an overview of general basic biosecurity practices. In the event of an animal health emergency, additional biosecurity measures may be implemented. Always refer to protocols developed for a particular response.



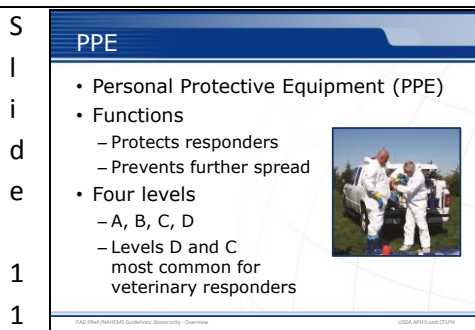
Responders may be required to visit many different premises. Personnel whose job responsibilities require them to visit multiple premises may come into contact with infectious agents. Without proper biosecurity precautions, they can transfer pathogenic agents from one premises to the next.

The following basic biosecurity practices should always be followed:

- Do not enter an animal area unless accompanied by a facility employee or authorized to do so by the facility owner.
- Backyard facilities are considered animal facilities.
- Follow all biosecurity practices when visiting these sites.



Pathogenic agents can be spread via contaminated clothing. It is important that animal health emergency responders adhere to the clothing requirements set out in the Biosecurity Plan. Clothing and footwear must be disposable or easily cleaned and disinfected. This includes boots, outerwear and gloves. Appropriate footwear may include rubber boots or disposable plastic boots or boot covers. Outerwear such as disposable or clean coveralls, laboratory coats, smocks, or other suitable outerwear must be worn when coming in contact with animals, their secretions, or manure. If visiting multiple facilities, be sure to have an adequate supply of clean or disposable coveralls, so a fresh pair can be used at each site. Remove outerwear when leaving a premises. Follow instructions for disposal or decontamination of outerwear. Wear disposable gloves such as latex or nitrile. Hands should be washed after removing gloves.




Personal protective equipment (PPE) includes clothing that protects responders from potentially harmful hazards and helps to prevent further spread of pathogens. The level of PPE required for a response will vary with the situation, the hazards, and pathogenic agent(s) involved. OSHA classifies PPE into four levels of protection for the responder. The levels range from D (lowest level of protection) to A (highest level). Level D consists of a basic work uniform to protect against nuisance contamination. Level C is the protection most often used with highly contagious foreign animal diseases, protecting the responder's skin and respiratory system. General agreement exists that Level C PPE would be adequate protection for veterinary responders in most animal disease situations. Emergency response activities in which veterinary responders are involved will almost never necessitate the use of Level B or Level A PPE. However, it is possible that veterinary responders may be needed to assist in emergency situations where these expanded levels of protection will be required. A basic familiarity with all levels of PPE protection will expedite onsite training in an actual animal health emergency. See FAD PReP/NAHEMS Guidelines: Personal Protective Equipment (PPE) (2011) for more details on the equipment appropriate to provide each level of protection. *[This photo shows responders putting on Tyvek® suits, boots, and gloves prior to contacting animals. Photo source: Jane Galyon, Iowa State University]*

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Cleaning and Disinfection (C&D)

- Cleaning and Disinfection
 - Two-step process
 - animal housing, vehicles, equipment, PPE
- Cleaning – step 1
 - Remove all organic matter
 - Manure, dirt, feed, etc.
 - Wash and rinse



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Cleaning and disinfection (C&D) procedures are vital for controlling and containing a disease outbreak and minimizing the transmission between premises. C&D procedures should be established for animal housing areas as well as any vehicles, equipment, and PPE used on the site. Proper cleaning and disinfection involves a 2-step process. Cleaning is step 1 - the physical removal of organic material such as manure, dirt, feed, or bedding. It is followed by a washing step to clean surfaces and remove any adhered debris, residual oils or body fluids. Most disinfectants are inactivated by organic material so it is important not to overlook the cleaning step. *[In this photo, these responders are cleaning and disinfecting boots. Photo source: Andrew Kingsbury, Iowa State University]*

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Cleaning and Disinfection (C&D)

- Disinfection – step 2
 - Apply approved disinfectant
 - Proper concentration
 - Proper contact time
 - Read safety precautions
 - Wear appropriate PPE
 - Ultraviolet radiation (sunlight) and drying


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Once the area or item has been cleaned and rinsed, disinfection is step 2. Apply the appropriate (EPA-approved) disinfectant. There are many different disinfectant products, application methods, and use concentrations. Always read the label instructions for proper use. Allow the disinfectant to sit on the surface for the proper contact time after application. The chemical disinfectant needs time to do its job and it should remain on the surface being disinfected for the time required by the product label. All chemical disinfectants have some degree of hazard with use, so always read the safety information on the label and wear the appropriate PPE when preparing and applying products. Ultraviolet radiation, as sunlight, and drying conditions may be necessary to remove pathogens from the contaminated ground of animal housing areas.

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Vehicles

- Designate “clean” and “dirty” storage areas in the vehicle
- Avoid driving through manure or wastewater
- Clean vehicle between premises visits
 - Tires, floor mats
 - Cover carpets

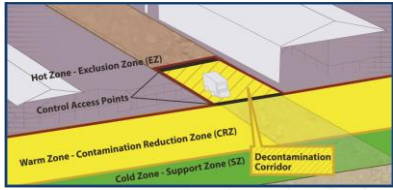


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Designate “clean” and “dirty” storage areas in the vehicle. Separate clean from dirty/contaminated clothes, supplies, and equipment in different areas of the vehicle. When at a premises, avoid driving through manure, wastewater or other organic material. Park on concrete or paved areas and away from barns, pens, pastures, or other animal areas. Avoid parking in areas where the vehicle may come in contact with run-off. Clean response vehicles between visits to animal production facilities. Cleaning should include tires and floor mats. Cover vehicle carpets with plastic floor mats. Commercial car washes with wheel-well washing provide adequate exterior cleaning. Tire sprays may be needed in some situations. *[This photo depicts a dirty bin used to hold used coveralls. When done, the bin should be sealed to prevent cross-contamination of clean items. Photo source: Danelle Bickett-Weddle, Iowa State University]*

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Work Zones



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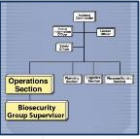
During an animal emergency response, establishing biosecurity work zones will enable and enhance access control procedures (e.g., entry, exit) in an effort to minimize the spread of pathogen onto or off of an infected or suspect premises. Responders should understand the location and implications of each biosecurity work zone. Work zones apply to personnel and vehicle traffic onto and off from the site as deemed necessary. This slide depicts the various work zones found at a response site.

- **Hot Zone or Exclusion Zone (EZ)** is the potentially contaminated or unsafe area (e.g., infected animal premises). Appropriate PPE must be worn in this area.
- **Warm Zone or Contamination Reduction Zone (CRZ)** is considered a high risk area due to the potential for exposure to pathogens and chemical disinfectants. All personnel are required to wear PPE.
- **Decontamination or Decon Corridor** is the area between the Hot Zone and the Warm Zone. Teams exit and enter the site through this corridor. Decontamination of personnel and disinfection of equipment occurs here. Once responders have doffed, disinfected, and decontaminated in the Warm Zone, they should move to the Cold Zone/Support Zone (SZ) through the designated **Control Access Points**.
- **Cold Zone or Support Zone (SZ)** is the clean/uncontaminated area of the site where responders should not be exposed to hazardous conditions. Support functions are based here. Donning of PPE prior to entry into the Hot Zone also occurs here.

[Work zones shown over a farm with the decontamination corridor and control access points marked. Illustration by: Dani Ausen and Andrew Kingsbury, Iowa State University.]

Incident Command System

- Biosecurity Group
 - Group Supervisor
 - Develops Biosecurity Plan
 - Ensures implementation of biosecurity measures
 - Team Leader(s)
 - Each supervises a Team




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The Incident Command System (ICS) is used to organize animal health emergency responses. Shown at the top of this organizational chart, the Incident Commander (IC) has overall responsibility for the management of the entire incident. Biosecurity matters are handled by the Biosecurity Group which is part of the Operations Section. The Biosecurity Group Supervisor is responsible for the Biosecurity Plan and for ensuring that appropriate biosecurity measures are implemented during an animal health emergency response. The Biosecurity Group Supervisor is responsible for multiple Teams, each led by a Team Leader. *[This illustration depicts the Incident Command structure with the Operations Section and Biosecurity Group Supervisor highlighted. Illustration by: Andrew Kingsbury, Iowa State University]*

Incident Command System

- Biosecurity Group
 - Team Leader
 - Supervises a Team assigned to defined area
 - Team Members
 - Provide front line assistance in containing, controlling a disease outbreak



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The Biosecurity Team Leader reports to the Biosecurity Group Supervisor, and is responsible for a Biosecurity Team assigned to a clearly defined area or a number of premises. Depending on the size of the response, there may be several Biosecurity Teams, each with its own Team Leader. Upon arrival at the Incident Command Post, Biosecurity Team Members will receive training regarding biosecurity procedures and practices specific to the incident. All members of the Biosecurity Team should be familiar with basic biosecurity principles, as well as the specific biosecurity protocols described in the Biosecurity Plan. Biosecurity Team Members are assigned to work on infected or contact premises and provide front line assistance in containing and controlling a disease outbreak. Biosecurity Team Members usually work individually on assigned premises with the owner, the owner's family, employees, and visitors. *[This illustration is repeated from the prior slide and depicts the Incident Command structure with the Operations Section and Biosecurity Group Supervisor highlighted. Illustration by: Andrew Kingsbury, Iowa State University]*

Biosecurity Plan

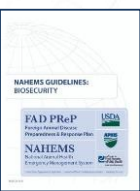
- Biosecurity Plan developed by:
 - Biosecurity Group Supervisor, Safety Officer
 - Approved by Incident Commander
 - Site-specific Plan addresses animals, personnel, vehicles, equipment and supplies, and organic material such as feed or bedding

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Biosecurity Plan describes the mitigation measures to prevent the potential spread of the disease agent. A site-specific Biosecurity Plan for the response is developed by the Biosecurity Group Supervisor in consultation with the Safety Officer and approved by the Incident Commander. The implementation and exercise of biosecurity protocols are integral to many response activities. Protocols are implemented to prevent disease spread by animals, personnel, vehicles, equipment and supplies, as well as any movement of organic material such as feed or bedding. The site-specific Biosecurity Plan must recognize and ensure adequate biosecurity measures are in place for each part of the response. The Biosecurity Plan includes protocols for: fixed operations, on-premises movement, mobile activities, and coordination with other groups.

For More Information

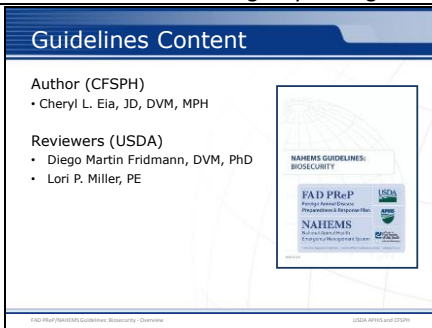
- FAD PRéP/NAHEMS Guidelines & SOP: Biosecurity (2013)
 - http://www.aphis.usda.gov/animal_health/emergency_management/
 - Biosecurity web-based training module
 - <http://naherc.sws.iastate.edu/>



FAD PRéP/NAHEMS Guidelines: Biosecurity - Overview USDA APHIS and OIE

More details can be obtained from the sources listed on the slide, available on the USDA website (http://www.aphis.usda.gov/animal_health/emergency_management/) and the NAHERC Training Site (<http://naherc.sws.iastate.edu/>).

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The slide titled "Guidelines Content" lists the author and reviewers. The author is Cheryl L. Eia, JD, DVM, MPH. The reviewers are Diego Martin Fridmann, DVM, PhD and Lori P. Miller, PE. A small inset image shows the cover of the "NAHEMS GUIDELINES: BIOSECURITY" document, which also features the FAD PReP and NAHEMS logos.

Guidelines Content

Author (CFSPH)

- Cheryl L. Eia, JD, DVM, MPH

Reviewers (USDA)

- Diego Martin Fridmann, DVM, PhD
- Lori P. Miller, PE

NAHEMS GUIDELINES: BIOSECURITY

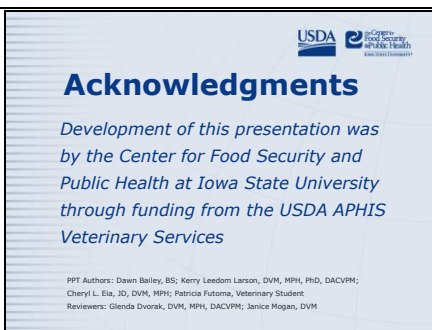
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This slide acknowledges the authors and reviewers of the Guidelines document.

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The slide titled "Acknowledgments" states that the development of the presentation was by the Center for Food Security and Public Health at Iowa State University through funding from the USDA APHIS Veterinary Services. It also lists the PPT authors and reviewers.

Acknowledgments

Development of this presentation was by the Center for Food Security and Public Health at Iowa State University through funding from the USDA APHIS Veterinary Services

PPT Authors: Dawn Bailey, BS; Kerry Leedom Larson, DVM, MPH, PhD, DACVPM; Cheryl L. Eia, JD, DVM, MPH; Patricia Futoma, Veterinary Student

Reviewers: Glenda Dvorak, DVM, MPH, DACVPM; Janice Hogan, DVM

USDA

Center for Food Security and Public Health

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